

1. INTRODUCTION

This section covers the identification, purpose, scope, background and organization of the Operations and Ground Systems (O&GS) test Plan.

1.1 IDENTIFICATION

This document establishes the policies, methods, and activities associated with the Operations and Ground System (O&GS) Project test program for the Hubble Space Telescope (HST) Second Servicing Mission (SM). The release of this document was prepared by the Systems Verification Group (SVG) and **(Hubble Space Telescope Observatory Management System) HSTOMS (Independent Test and Verification)** ITAV at the Goddard Space Flight Center (GSFC) for the National Aeronautics and Space Administration (NASA). The document will be revised, following the implementation of the test program, by the O&GS Project Servicing Mission System Engineer (SMSE) in conjunction with representatives from the Code 500 ITAV team and O&GS Project Mission Operations and Systems Engineering Support (MOSES) SVG. This revision will be written to reflect the as-run test program, if it differs from the planned approach.

1.2 PURPOSE

The purpose of this document is to define the testing activities to be performed to verify O&GS readiness for SM. In addition, this plan presents the approach that will be used in planning, preparing, executing, and reporting on the O&GS Project Operations Test Program for the HST SM. This test program includes the integration and testing of the HST ground system, HST Project Data Base (PDB), HST flight software, HST SM commanding and operation procedures, orbital replacement instruments (ORIs), orbital re-

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placement units (ORUs), and the ground and space communication networks.

This document establishes the policies, methods, and activities associated with the implementation of this program and provides information necessary to support the planning activities of organizations supporting the test program. Individual test plans will be eliminated, however, detailed test planning information will be developed on a test by test basis and included in Section 1 - 5 of the test plan/procedure for each test. It is expected that efforts to generate Sections 1 - 5 of this plan/procedure will commence three months prior to the planned execution of the test.

All organizations supporting the Operations Test Program will be expected to review this document prior to baselining. After baselining, this document will be controlled by the HST Level II Configuration Control Board (CCB). The document will be maintained throughout the test program to reflect changes in the policies, procedures, methods, and activities associated with the test program.

1.3 SCOPE

This plan is intended to document the O&GS Project Operations SM Test Program as defined by the **Operations Testing Working Group (OTWG)**. This test program will validate functionality, interfaces, and compatibility of the HST ground system, HST PDB, HST flight software, HST SM commanding and operations procedures, ORUs/ORIs and ground and space communication networks. The O&GS Project SM test program will verify the HST Project Level 2 requirements baselined in STR-45 that are mapped to the O&GS Test Plan. The HST O&GS Project Level 3 requirements (derived from the Level 2 requirements) are mapped to the individual tests that will verify those requirements. The Space Telescope Operations Control Center (STOCC) and Vehicle Electrical System Test (VEST) facility

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at GSFC will be utilized to support this program in addition to facilities at the Space Telescope Science Institute (ST ScI), Kennedy Space Center (KSC), including the orbiter, Space Telescope Ground Terminal (STGT), Deep Space Network/Ground Network (DSN/GN), and Johnson Space Center (JSC).

1.4 BACKGROUND

The **SM** test program is largely based on the First Servicing Mission (FSM) test program. The second servicing mission test approach incorporates the lessons learned in the first servicing mission and will eliminate unnecessary plans, reports, and time intensive reviews and focus more attention on resource scheduling, management and coordination of all pre-SM testing activities.

1.5 ORGANIZATION

The organizations that will participate in the O&GS Project Operations SM Test Program are depicted in Figure 1-1. In general, the O&GS Project, through the O&GS SMSE, is responsible for the definition and implementation of the O&GS Project Operations SM Test Program. The O&GS Project Operations SM Test Program will take direction from the HST Project Verification Team and coordinate the activities of all organizations supporting this program.

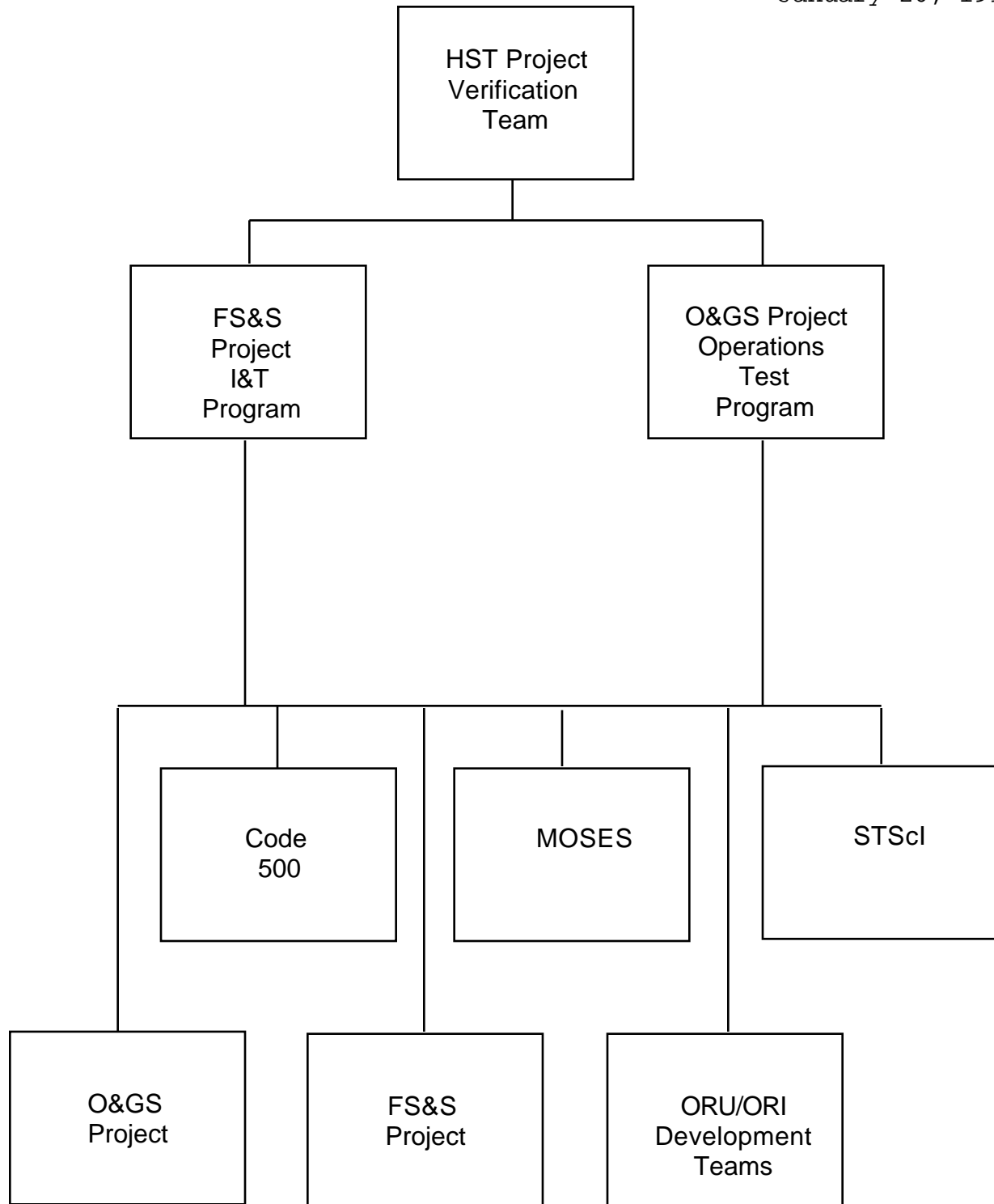


Figure 1-1 Participation for the SM Test Effort

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The HST Project Verification Team, under the direction of the **Deputy Associate Director of Flight Projects for HST**, shall have overall responsibility for insuring the completeness of the HST Project's SM Verification program. This program includes the test activities conducted by the O&GS and Flight Systems and Servicing (FS&S) Projects. The approach and content for the test programs developed by each project are reviewed and approved by the HST Verification Team. Testing status and results are presented to the HST Verification Team and the team provides oversight throughout the implementation of the test programs.

The FS&S Project is responsible for Integration and Test (I&T) of all replacement hardware (H/W) prior to launch. As part of the O&GS Project Operations SM Test Program, the FS&S I&T program provides support during ORU/ORI to ground system compatibility, and commanding and operations check out. Close coordination between the FS&S I&T program and the O&GS Project Operations SM Test Program is required to maintain ORU/ORI development flow.

The O&GS Project, through the O&GS SMSE shall have overall responsibility for planning, preparing, executing, and reporting on the O&GS Project Operations SM Test Program. In addition to reporting to the HST Verification Team, the O&GS SMSE will report test status and results to the Servicing Mission Operations Manager (SMOM).

The O&GS SMSE shall identify a lead organization for each test within the test program. The appendix for each test contains the lead organization, support organization and the products each organization is responsible to produce for that particular test. The two organizations that will serve as lead organizations are MOSES SVG and ITAV. The lead organization will be responsible for:

- coordinating all activities associated with planning, preparation, execution, and reporting phases of a specific test.

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- reporting test status and results to the O&GS SMSE.

The O&GS SMSE shall form an O&GS SM Project Operations Test Team to support the implementation of the test program and to assist in the coordination of test activities. The O&GS Project Operations test team will provide a forum in which testing status is presented, test resource requirements are managed, and testing related problems are identified and resolved. The lead organization for each test will be responsible for implementing the actions decided on by the O&GS Project Operations test team. Supporting organizations, which are any organizations listed in figure 1-1, **are required to support the test program and** shall provide the support as specified in this document, provide input for the test procedures associated with each test, and shall respond to the direction of the O&GS SMSE and lead organization.

1.6 TEST RESPONSIBILITY

Several organizations will be responsible for the implementation of the O&GS Project Operations SM Test Program described by this document.

The O&GS SMSE and the Code 500 HSTOMS Manager, with support from the ITAV and SVG teams, will share the overall responsibility for defining and implementing the O&GS Project Operations SM Test Program based on the test objectives and approach defined in Section 2 **of this document**. These responsibilities will vary throughout the test program based on the category of testing being performed at the time. In general, the O&GS SMSE will have overall responsibility for all Servicing Mission Ground String Tests with support from the lead organization and the support organization respectively **ITAV** and **SVG**. SVG will serve as the lead organization with ITAV the support organization on all hardware Servicing Mission Ground Tests (SMGTs). Similarly, the Code 500 HSTOMS Manager will have overall responsibility for all Interface Performance Activity (IPA), Performance Demonstration

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Test (PDT) and End-to-End (ETE) tests with support from the ITAV and SVG teams. ITAV will be the lead organization for all IPA, PDT and ETE testing with SVG support.

Technical support for all test activities will be coordinated by the lead organization, and supported by MOSES Systems Engineering and the FS&S Project. Additional technical support, facilities, and personnel will be provided by the greater HST community including the O&GS Project, FS&S Project, STScI, hardware development contractors, Code 500 support elements, MOSES Operations **Support Team**, KSC, and JSC.